# IMPORT RISK ANALYSIS AND PROPOSED PHYTOSANITARY REQUIREMENTS FOR THE IMPORTATION OF BULK MAIZE (ZEA MAYS L.) FROM THE USA

# **TECHNICAL WORKING GROUP 4 - OPERATIONAL ISSUES**

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Membership

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# 1. Terms of reference

- Identify operational issues relevant to the importation of maize grain from the USA.
- Consider various risk management options consistent with the Australian government policy, the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement) and relevant international standards, including the FAO International Standards for Phytosanitary Measures.
- Liaise with other Technical Working Groups (TWGs) and national and international technical experts, as necessary, on relevant issues identified by other TWGs and this working group.
- Develop and assess operational procedures for implementation of management options recommended by other TWGs.
- Report the findings of the working group to the Risk Analysis Panel (RAP).

# 2. Introduction

Technical Working Group 4 was established to examine operational issues relevant to the importation of bulk maize grain from the USA and to evaluate the risk management options identified by the other TWGs. TWGs 1 to 3 identified pathogens, arthropod pests and weed seeds of quarantine concern to Australia which can occur in the pathway of bulk maize grain from the USA. The pathway of bulk maize grain from the USA includes maize grain, admixtures of other crop seeds and weed seeds, soil and trash.

TWG 1 (pathogens) identified 16 pathogens which can occur in the pathway that are capable of causing significant economic damage, including 10 pathogens which present a higher risk. This group concluded that it would not be possible to source maize from areas in the USA free of all high risk quarantine pathogens and that the only acceptable way of minimising risks is to heat treat the grain either off-shore or at the port of entry.

TWG 2 (arthropod pests) identified 14 pests of concern to Australia that have a significant risk of being associated with bulk maize grain from the USA and are capable of breeding in stored grain. Additional pests were identified as having a significant risk of being associated with damp stored maize grain (2 pests) and infestable pulse admixture (2 pests) providing a total of 18 pests of quarantine concern to Australia. The group noted the effectiveness of heat as an insecticidal treatment, particularly at temperatures above 65° C, noting however that it is important to maintain security after treatment to prevent re-infestation.

TWG 3 (weeds) identified clearly that the risk of introducing weed seed contaminants in maize grain imports for processing is high. They identified 26 weed species which are associated with bulk maize grain imported from USA which are not yet recorded as present in Australia and should, on the basis of their assessed risk, be prohibited entry into Australia. They identified a further 52 weeds that were under official control in Australia or were herbicide resistant variants of weeds present in Australia. The group considered that steam heat treatment of imported maize would present the lowest risk protocol, particularly if the treatment can be conducted at the port of entry or prior to export. They also noted that further trials may be required to optimise the temperature and time required to kill all quarantine weed seeds and admixtures.

# Overall conclusion arising from the work of the TWGs

The proponent requested that AQIS -

"Assess the sourcing of maize from the USA with the emphasis being that all significant quarantine risk are handled offshore and that the grain be delivered to Australia for processing, and animal feed use."

Given the conclusions reached by the TWGs, the only available safe approach, from a plant quarantine perspective, would be to allow entry of grain which has been rendered sterile and disinfected at the port of export in the USA. In addition, observance of a series of post treatment conditions would be essential (eg concerning product segregation, ship loading path and ship hygiene)

It is important to note that the option of rendering grain sterile and disinfecting it at the port of entry on arrival in Australia was previously used in 1995 and remains as an option (subject to the existence of approved facilities). However this is outside the scope of the request from the proponent and consequently is not being specifically addressed in this Import Risk Analysis.

# 3. US Corn Grades

The issue of grade in relation to US corn is relevant to the quarantine risk associated with bulk maize imports, particularly in relation to weed seed issues and the possible detrimental effects on the efficacy of treatments if levels of foreign matter are excessive. Accordingly it is useful to briefly examine the criteria used by the Federal Grain Inspection Service (FGIS) within the United States Department of Agriculture for assigning grades.

In terms of quarantine risk, it is interesting to note that 'corn' is defined as "Grain that consists of 50 per cent or more of whole kernels of <sup>1</sup> shelled dent corn and/or shelled flint corn (*Zea mays* L.) and may contain not more than 10.0 percent of other grains for which standards have been established under the United States Grain Standards Act." Other grains for which standards have been established are barley, flaxseed, oats, rye, sorghum, soybeans, sunflower seed, triticale, and wheat.

Corn is divided into three classes based on colour: Yellow corn, White corn and Mixed corn. Each class is divided into five US numerical grades and US Sample grade. Special grades are provided to emphasise special qualities or conditions affecting the value and are added to and made a part of the grade designation. They do not affect the numerical or sample grade designation.

<sup>&</sup>lt;sup>1</sup> A kernel of flint corn normally has a rounded crown and is usually smaller than a dent kernel. A kernel of dent corn is normally characterised by a distinct depression or dent in the crown of the kernel.

Maximum limits of				
		Damaged	Kernels	
Grade	Minimum test	Heat damaged	Total	Broken corn
	weight per	kernels		and foreign
	bushel			material
	(pounds)	(percent)	(percent)	(percent)
US No. 1	56.0	0.1	3.0	2.0
US No 2	54.0	0.2	5.0	3.0
US No. 3	52.0	0.5	7.0	4.0
US No. 4	49.0	1.0	10.0	5.0
US No. 5	46.0	3.0	15.0	7.0
US Sample grade				

 Table No 1 – Grades and Grade requirements

US sample grade is corn that:

- (a) Does not meet the requirements for the grades US Nos. 1,2, 3, 4, or 5; or;
- (b) Contains 8 or more stones which have an aggregate weight in excess of 0.20 percent of the sample weight, 2 or more pieces of glass, 3 or more Crotalaria seeds (*Crotalaria* spp.),2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognised harmful or toxic substance(s), 8 or more cockleburs (Xanthium spp.)or similar seeds singly or in combination, or animal filth in excess of 0.20 percent in 1,000 grams; or
- (c) Has a musty, sour or commercially objectionable foreign odour; or
- (d) Is heating or otherwise of distinctly low quality.

## 3.1 Infested Corn

Infested corn is considered to be a special grade designation which further qualifies other grades and classes

Example: US No. 3 Yellow corn, infested

Infested corn is corn that is infested with live weevils or other live insects injurious to stored grain. Live weevils include rice weevils, granary weevils, maize weevils, cowpea weevils, and lesser grain borers. Other live insects injurious to stored grain includes grain beetles, grain moths, vetch bruchids, and larvae. Corn is considered to be infested if representative samples (500 grams per 2,000 bushels) are found to contain two live weevils, or, one live weevil plus 5 other live insects injurious to stored grain, or, ten other live insects injurious to stored grain.

It is clear from the tolerance levels applied that significant levels of infestation can be present in US corn, without the grain being formally certified as infested.

## 3.2 Broken Corn and Foreign Material

Broken corn is all matter that passes readily through a 12/64 round hole sieve and over a 6/64 round hole sieve. Foreign material is all matter that passes readily through a 6/64 round-hole sieve and all matter other than corn that remains on top of the 12/64 round-hole sieve. The combined results of broken corn (BC) determination and foreign material (FM) are used for the grading factor, broken corn and foreign material (BCFM).

# 3.3 Damaged kernels

Damaged kernels are kernels and pieces of corn kernels that are badly ground-damaged, badly weather damaged, diseased, frost-damaged, germ damaged, heat-damaged, insect -bored, mould-damaged, sprout damaged, or otherwise damaged. FGIS standards for corn further define the types of corn damage.

# 3.4 Conclusion on US Corn grades.

Several quarantine considerations arise from the US Corn grades. Firstly, irrespective of grade, corn as defined is only required to contain 50% of whole kernels of corn (*Zea mays* L.) and may contain up to 10% of other grains for which standards have been established under the United States Grain Standards Act. This has clear implications for the presence of other seed-borne pathogens on grain admixture and makes the overall assessment of risk extremely difficult. In terms of the criteria used to differentiate between Grades 1 to 5, the most relevant are the percentage tolerances of broken corn and foreign matter, due to the increasing quantities of weeds seeds and plant debris from Grades 1 to 5 and in sample grade. Damaged grain may also be relevant depending on the reason for damage, which can include disease and other pest damage with implications for the quarantine risk.

On the basis of US Corn Grades and taking into account Australia's experience with previous shipments of maize from the USA, Australia's grade specification for any future shipments of maize feedgrain should be US No. 2 or better.

Given the earlier conclusion that grain would need to rendered sterile and disinfected at the port of export in the USA, the likelihood of achieving this outcome is greater if a higher grade of corn is used, due to lower levels of weed seeds and foreign matter. It is noted however that if the process used to treat the grain can be shown to be effective on other grades of corn (including weed seeds) this would be an acceptable alternative.

# 4. Post Treatment Risk Management

# 4.1 Inspection Agencies

The United States export grain industry is not regulated to the extent that the grain industry in Australia is, however the Federal Government provides an infrastructure for Government Certification of documented quality grades. There is an accreditation and qualification system for individuals, agencies and certification companies to maintain certification integrity.

The following Inspection Agencies are involved in inspection and certification of grain in the United States:

- Animal and Plant Health Inspection Service (APHIS), the organisation responsible for the issuance of phytosanitary certificates. Certificates are issued on the basis of Federal Grain Inspection Service (FGIS) inspections and sampling, and analysis of the samples by the Federal Seed Laboratory.
- FGIS. The role of FGIS and FGIS Agencies is primarily to maintain a recognised system of grading for commercial grain trading.
- State Departments of Agriculture. Many State Departments of Agriculture have a memorandum of understanding with APHIS. They conduct surveys for diseases in seed crops and specific pests and have a capacity to provide seed laboratory services.

# 4.2 Inspection standards

Some members of the Australian Grain Mission 1995 expressed the view that hygiene and operational standards were poor at some US elevators. Elevators visited during that Mission confirmed that view. Unlike Australia, where hygiene standards are a mandatory condition for the export of prescribed grains and prescribed goods, enforced by Legislation, inspection and certification in the United States is based solely on inspection, sampling and analysis of the grain lot. The FGIS sample and inspection procedures as documented in the Grain Inspection Handbook therefore lack the second tier hygiene and treatment controls that underpin Australia's sample and inspection standards are discussed later in this document.

# 4.3 Export Terminals

Grain is mainly transported by truck from farm/farm storage to elevator. Harvest and transport to storage is often performed by contractors who 'follow the season' from south to north. Transport from elevators to sub-terminals to export terminals in Pacific North West and Texas Gulf is by rail. In addition, large quantities of grain are moved by barge down the Missouri/Mississippi and other river systems.

Export terminals are situated in the Pacific North West (PNW), Texas Gulf, Louisiana and California. They tend to operate on a 'just in time' principle with consolidated cargo moving from inland elevators just prior to the vessel arrival at the port. The terminals visited by the Grain Mission 1995 were flow through systems with little excess storage capacity.

The Grains Mission 1995 found that:-

- Export Terminals have a capacity to blend grains and screenings similar to inland elevators and sub-terminals. This blending to achieve quality grades is normal practice in the 'price for quality' driven US grain market.
- Vessel loading is controlled by FGIS who release shipping bins for loading after grade standards have been checked.

In consideration of post treatment security of maize consolidated for export to Australia the following factors require consideration.

- Management practices, particularly in usage of common elevators and flow paths, and segregation capacity of export terminals for storage of the treated lot.
- Hygiene/pest control practices, especially the potential for inadequate treatments to mask infestations of quarantine pests or encourage insecticide resistant strains of cosmopolitan pests, and the capacity of these pests to cross infest/infect post treatment.
- Reject/treat/reinstate procedures for export grain, and capacity to inspect and if necessary divert grain from shipping bins.

Detailed procedures for storage, handling, hygiene and inspection/rejection of the treated maize and standards for pre loading verification of compliance will need to be supplied to the Export Terminal and to APHIS. In the absence of data, it is assumed that APHIS and/or FGIS do not have inspection/certification standards or accreditation training for acceptable procedures. An initial pre-clearance visit by an Australian Inspector may be required to ensure correct interpretation of the procedures.

An initial pre-clearance or verification of interpretation of procedures visit by an Australian Inspector could ensure that the imponderables such as 'how clean is clean' are understood by all stakeholders. Subsequent shipments may be 'pre-cleared' on the basis of representative samples

submitted for analysis prior to shipment, and a grain flowpath hygiene condition certificate endorsed by APHIS or an approved certifier supplied.

# 4.4 Ship inspection

The Grain Mission 1995 reported that FGIS has responsibility for carrying out stowage examinations on vessels in accordance with the provisions of the US Grain Standards Act.

Stowage space is examined for:-

- residues of previous cargoes
- rust scale and paint scale
- unsanitary conditions such as animal/rodent excreta or decaying matter
- unknown substances
- standing water in the hold
- objectionable foreign odours
- infestations with rodents or insects.

Holds which have been passed by FGIS as fit to load are listed on an Official Stowage Examination Certificate issued by FGIS. This certifies that the stowage areas were examined on a given date and found to be substantially clean, dry, free of insect infestation and suitable to carry grain or commodity.

Residues of previous cargoes in recent fertilizer vessels from USA suggest that USA certification bodies, particularly private surveyors, either have a different interpretation as to what constitutes 'substantially clean, dry, free from insect infestation' than either their Australian or Canadian counterparts or their ship survey procedures are inadequate. Schedule 4 of the, Grain, Plants and Plant Products Orders, made under the Export Control Act (1982) and the Ship Inspection section of the Field Crops Manual provide extensive instruction on the required ship survey standards and procedures used in Australia.

A protocol for offshore treatment of maize needs to include ship survey standards and procedures to the Australian standard. A pre-clearance visit by an Australian inspector will be required to ensure that the interpretation and application of these standards are understood by the certification body.

# 5. Proposed Import conditions for maize feedgrain from USA

## Recommendation

Given the quarantine risk identified by TWG's 1,2 & 3 and the practical problems associated with control measures, it is recommended that bulk maize permitted to be imported from the USA to meet the proponent's request be subject to the conditions set out below. The conditions reflect the need for an integrated approach given the wide range of pests involved.

## 5.1 Sourcing

The commodity should be sourced from the Northern US States in the maize growing area, where the incidence of several of the more significant maize diseases is lower than in the Southern States and where karnal bunt has not been detected in surveys of wheat crops. The Northern States also have the advantage of a lower incidence of insect pests of concern compared to the Southern States. Also, *Striga asiatica* is not found in these states.

# 5.2 Grade

The permitted maize grade standard should be US No.2 Grade or better.

Note: Given the earlier conclusion that grain would need to rendered sterile and disinfected at the port of export in the USA, the likelihood of achieving this outcome is greater if higher grades of corn (No.2 or better) are used, due to lower levels of weed seeds and foreign matter. It is noted however that if the process used to treat the grain can be shown to be effective on other grades of corn (including weed seeds) then lower grades may be an acceptable alternative.

# 5.3 Transportation

The selected maize is to be transported, for subsequent shipment, to a port on the Pacific North-West in a manner which preserves its identity.

Note: Previous correspondence between AQIS and the Federal Grain Inspection Service (FGIS) in 1995 resulted in an agreement by FGIS to provide identity preserved statements on export certificates stating that:

"The grain loaded on board the MV (vessel name) was received from railcars loaded at (location and date) under the supervision of FGIS authorised/licensed personnel".

# 5.4 Treatment

The maize is to be treated in a facility at the export port to render non-viable all seed present (ie (maize, other crop seeds, admixture and weed seeds) and to kill all plant pathogens and arthropod pests present in the grain.

# 5.5 Post Treatment Conditioning

The treated maize should be conditioned immediately after treatment in a thoroughly cleaned plant to ensure that it is cooled to near ambient temperature and that its inherent moisture content is not more than 14% (wet basis).

Note: The requirement to condition grain to a moisture content of not more than 14% does not strictly speaking fall within the quarantine regulatory considerations, however it is essential to minimise heating of the grain and to prevent the development of mycotoxin producing fungi in the maize, and to reduce its susceptibility to re-infestation and re-infection.

## 5.6 Verification of treatment process

Samples of the treated maize are to be collected by either FGIS authorised/licensed personnel or APHIS personnel and forwarded by secure, express air freight to AQIS for analysis to determine the efficacy of treatment. AQIS will also require documentary evidence of the treatment process such as records showing exposure period// temperature details. These will be required for audit purposes.

# 5.7 Storage prior to shipment

The treated and conditioned maize stocks are to be stored in a thoroughly cleaned, segregated facility to prevent any contact with untreated grain stocks or confusion as to the special status of the treated maize.

# 5.8 Loading path to export vessel

The grain loading path from the storage location to the ship must be thoroughly clean and free from residues from previous grain handling operations.

# 5.9 Phytosanitary certification

AQIS will require a phytosanitary certificate issued by APHIS including the treatment details for the maize and certifying that no infestation was detected in representative samples inspected during loading of the vessel.

# 5.10 Ship hygiene

The ship to be loaded must be pre-inspected and certified to be free from previous cargo residues and live insects.

Note: Standard stowage examination procedures are used by FGIS to certify all stowage space examined and result in the issuance of a certificate stating that: "Stowage space examined on the above date and found to be substantially clean, dry, free of insect infestation, and suitable to store or carry grain. Experience from inspection of bulk carriers arriving in Australia and from the US Grain Mission in 1995 has clearly shown that the interpretation of 'substantially clean' by FGIS is not as rigorously enforced as the Australian or Canadian standards. This will require further clarification by AQIS to US authorities to ensure that ship inspection meets the AQIS export standard. Alternatively, this may be achieved by preclearance procedures using selected AQIS staff.

# 5.11 On arrival Inspection

On arrival of the ship in Australia, the treated maize cargo is to be inspected by AQIS prior to and during discharge of the cargo. The inspection is to ensure that the condition of the cargo is consistent with the analysis conducted on pre-shipment samples and that the treated maize has not become infested or in any other way contaminated in post treatment storage or from the ship. The inspection is also to verify commodity grade compliance that the maize is US No. 2 or better. Following successful AQIS inspection, the cargo may be released from quarantine for unrestricted movement.

# 6. References

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